PROJECT SPECIFIC PLAN FOR LEAD DELINEATION IN THE AREA 1 PHASE II TRAP RANGE

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

AUGUST 1997

ORIGINAL

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PROJECT SPECIFIC PLAN
LEAD DELINEATION IN THE AREA 1, PHASE 2 TRAP RANGE

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LIST OF ACRONYMS AND ABBREVIATIONS

A1PII	Area 1 Phase II
ASL	Analytical Support Level
AWWT	Advanced Wastewater Treatment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
dpm	disintegrations per minute
DQO	Data Quality Objective
EM	Environmental Monitoring
FAL	field activity log
FEMP	Fernald Environmental Management Project
FRL	final remediation level
GFAA	graphite furnace atomic absorption
GPS	Global Positioning System
kg	kilogram
mg	milligram
OSDF	On-Site Disposal Facility
OU5	Operable Unit 5
PWID	Project Waste Identification Document
QA/QC	quality assurance/quality control
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SCEP	Sitewide Characterization and Excavation Project
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
STP	Sewage Treatment Plant
TCLP	toxicity characteristic leachate procedure
V/FCN	variance/field change notice
WDSS	Waste Disposition Support Services

1.0 INTRODUCTION

1.1 PURPOSE

The Trap Range, located in the Southeast quadrant of the Fernald Environmental Management Project (FEMP) and just southeast of the Sewage Treatment Plant (STP) access road, was used by FEMP employees for recreational purposes from the mid-1950s until 1988. This resulted in surface deposition of the lead-shot and trap fragments. An evaluation (WBS No. 50.03.14) was carried out during the Remedial Investigation/Feasibility Study (RI/FS) to characterize soil contamination in this area. Soil sample analytical results indicated six locations with lead concentrations above the Final Remediation Level (FRL) of 400 mg/kg established in the Operable Unit 5 (OU5) Record of Decision (ROD). The results also identified several arsenic concentrations exceeding the FRL of 12 mg/kg. Arsenic is a metal impurity in the lead-shot, and the high concentrations are co-located with the high lead concentrations. The RI/FS data, however, is not adequate for remedial design purposes because sampling was not carried out with sufficient density to delineate the areal extent of contamination. Moreover, sample collection during the RI/FS characterization was restricted to surface soil sampling due to the assumption that lead is relatively immobile in soil.

There are three goals of this Area 1 Phase II (A1PII) pre-design investigation. The first is to delineate the areal extent of the above-FRL soil contamination in the area of the former Trap Range. Secondly, although vertical migration of the metal contamination through soil is unlikely, additional sampling at depth must be conducted to confirm this. Finally, due to the above-FRL concentrations of lead discovered during the RI/FS, soil excavation is anticipated. As a result, soil planned for excavation must be analyzed for lead by the Toxicity Characteristic Leachate Procedure (TCLP) to determine if the material is characteristically hazardous. TCLPs will be focused on excavated material with lead concentrations above 100 mg/kg (i.e. the twenty-times rule). Note that it is not anticipated that arsenic concentrations will approach the 100 mg/kg characteristically hazardous trigger level for arsenic, as no RI/FS arsenic concentration in this area exceeds 25.3 mg/kg.

1.2 SCOPE

In the FEMP Trap Range vicinity, the surface and immediate sub-surface soil will be sampled in 50 locations. The samples will be analyzed for total lead and arsenic by either the Graphite Furnace Atomic Absorption (GFAA) method or the Inductively Coupled Plasma (ICP) Spectroscopy method. The results of these analyses will be used to delineate the vertical and horizontal extent of soil contaminated above the

FRLs of lead and arsenic (400 mg/kg and 12 mg/kg, respectively). In addition, the six sample locations where above FRL concentrations of lead were detected during the RI/FS will be analyzed for lead by TCLP analysis. All sampling and analysis activities will be consistent with the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ), and Data Quality Objective (DQO) Number SL-036, Rev. 2 (Appendix A).

1.3 KEY PROJECT PERSONNEL

The team members of the Soil Characterization and Excavation Project (SCEP) and Environmental Monitoring (EM) listed in Table 1-1 below are key project personnel to the performance of this project.

TABLE 1-1
KEY PROJECT PERSONNEL

TITLE	PRIMARY	ALTERNATE
A1PII Project Manager	Steve Garland	Cliff Blanchard
A1PII Characterization Lead	Alex Duarte	Joan White
Characterization and Sampling Manager	Joan White	Mike Frank
Field Sampling Lead	Mike Frank	Tom Buhrlage
Surveying Lead	Jim Schwing	Dean Shanklin
Data Management Contact	Jeff Maple	Susan Marsh
Health and Safety Contact	Jack Patrick	Lewis Wiederman
Quality Assurance Contact	Reinhard Friske	Harold Swiger
Laboratory Contact	Al Bacon	Bill Westerman
Waste Disposition Contact	Susan Lorenz	Ken Belgrave

2.0 SAMPLING PROGRAM

In order to establish a sampling program for this investigation, SCEP personnel evaluated all available historical information, including the Sitewide Environmental Database (SED), OU5 Task Closure Reports, and interviews with former members of the FEMP Trap Shooting Club. A previous soil study of the Trap Range completed in 1993 included analysis of 18 soil samples in addition to a metal detector survey that was carried out to characterize the general distribution of the lead-shot. This preliminary study was inconclusive, but it provided some general information on which to base this study.

Just prior to devising this sampling plan, the spatial distribution of lead shot in the former Trap Range was estimated by evaluating the lead-shot distribution in a similar facility, where the shot is readily visible. The approximate spatial distribution of the lead-shot at the FEMP Trap Range was then examined by using a scoop and a sieve. Beginning in areas of high lead shot concentration, soil scoops were collected to several inches below the surface, and sieved for lead-shot. After moving approximately 30 to 50 feet toward the periphery, this process was repeated. When a scoop revealed little or no lead shot, and a second nearby scoop verified this finding, then the location was marked with a flag. Once the approximate periphery of the shot distribution was flagged, the flag locations were surveyed.

The sample locations for this investigation (shown on Figure 2-1 and listed in Appendix B) were established at selected nodes of a 50-foot by 50-foot sampling grid placed over the FEMP Trap Range area. The selected locations were based on the existing RI/FS data and the scoop and sieve examination described above. The basis of the sample locations is as follows:

- Because one goal of this study is to delineate lead and arsenic concentrations in this area at the 400 mg/kg and 12 mg/kg levels, respectively, a greater sampling density was selected along the assumed periphery of the contamination.
- Several sample locations were also selected approximately 100 feet beyond the assumed periphery of the lead shot to insure that the extent of contamination is bounded for modeling purposes.
- Several sample locations were also selected in the middle of the shot distribution pattern where high lead concentrations were detected during the RI/FS investigation. The purposes of these samples is to: 1) investigate the vertical extent of the contamination, 2) evaluate the soil anticipated for excavation by TCLP analysis, and 3) to add data for modeling purposes.

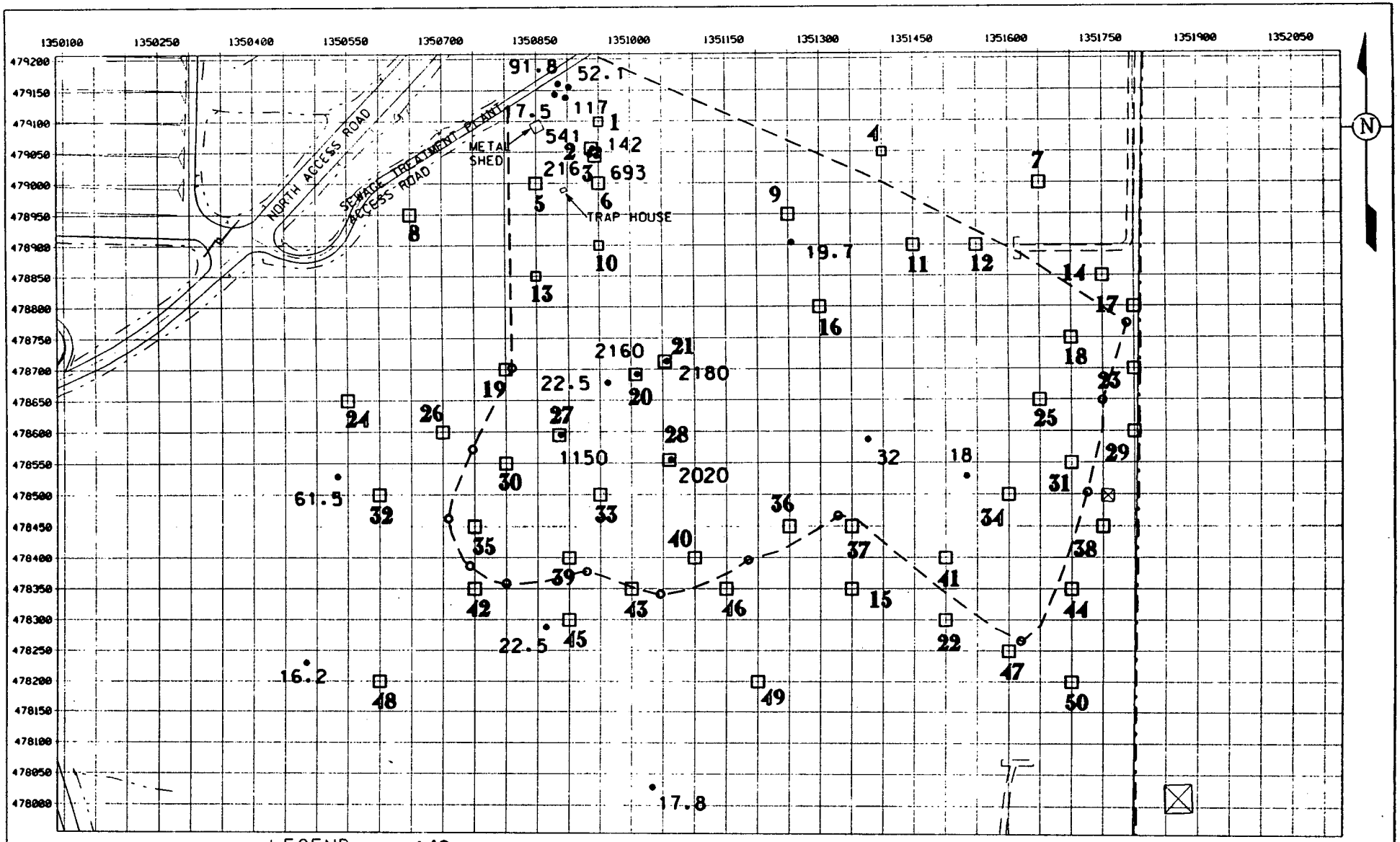
The sampling locations identified in Appendix B will be surveyed using the Geodimeter survey instrumentation or the Global Positioning System (GPS), as conditions and schedule dictate. These

locations will then be identified with a numbered flag. If surface or sub-surface obstacles prevent the collection of the sample at the designated location, it can be moved up to three feet in radius from the original location. The distance and direction in which the location is moved will be noted on the Field Activity Log (FAL). Sample locations moved more than three feet from the original location must be documented on a Variance/Field Change Notice (V/FCN), and re-surveyed.

2.1 SOIL SAMPLE COLLECTION

All cores will be collected using a 3" diameter hand auger, as identified in SMPL-01, *Solids Sampling*. At the discretion of the Field Lead, cores may be collected using the Geoprobe® Model 5400 with the Macro-core® sampler. If this is the case, Geoprobe® sampling must be consistent with EQT-06, *Geoprobe® Model 5400 Operation and Maintenance*. Prior to collection of the soil cores, the field sampling technician will remove all surface vegetation within a six-inch radius from the points to be sampled using a stainless steel trowel, and taking care not to remove any of the surface soil. If the hand auger is used, each six-inch sample interval will be collected individually. If the Geoprobe is used, it will be driven to a depth of 12 inches at each sample location. Upon retrieval, each soil core will be laid on new clean plastic, and divided into the appropriate samples (0"-6" and 6"-12"). Regardless of the sample collection apparatus, the samples will then be placed into the appropriate container for transport to the on-site laboratory without removing lead shot that may be present.

To meet the 10% minimum off-site analysis requirement of the Sitewide Excavation Plan (SEP) and DQO SL-036, Rev. 2, as well as the field quality control (QC) sample requirements, twice the sample volume will be collected at locations 3, 21, 27, 28 and 45 for both the 0"-6" and the 6"-12" samples. The sample volume will be homogenized, then split according to SMPL-21, Section 6.6, and placed into separate containers for transport to the on-site laboratory. Note that SMPL-21 refers to this as a split sample, but it will serve the purposes of the duplicate sample required by the SEP. All samples, including duplicates, will be assigned a unique sample identification number according to the scheme presented in Section 2.3 and identified in Appendix B. Upon completion of sampling activities, all boreholes will be backfilled using bentonite, and then hydrated.



LEGEND:

142 • RI/FS LEAD RESULT (ppm)

5 □ PROPOSED SAMPLING LOCATION

o ESTIMATED BOUNDARY FLAG

— — — ESTIMATED BOUNDARY OF LEAD SHOT

·—·— FEMP BOUNDARY

SCALE

220 110 0 220 FEET

DRAFT

v:\6scrw2\dgn\empshor\dpthework030.dgn
STATE PLANAR COORDINATE SYSTEM 1983

13-AUG-1997

FIGURE 2-1. PROPOSED TRAP RANGE SAMPLE LOCATIONS

2.2 SOIL SAMPLE ANALYZED

Samples will undergo laboratory analysis for total lead and arsenic by GFAA or ICP. Per requirements of the Sitewide Excavation Plan and DQO SL-036, Rev. 2, a minimum 10% of samples (as identified in Appendix B) will be shipped to a FDF approved off-site laboratory for analysis at Analytical Support Level (ASL) D. For samples analyzed off-site, a duplicate sample will be analyzed at the on-site laboratory at ASL D for QC purposes. All other samples will be analyzed at the on-site laboratory at ASL B. Selected samples will also be analyzed for TCLP lead to ASL D at an off-site laboratory. Duplicate samples will also be analyzed at ASL D at an off-site laboratory. Physical samples collected for laboratory analysis of total lead and arsenic by GFAA or ICP, as well as for TCLP analysis of lead, will be prepared by the laboratory doing the analysis according to SW846, Volume 1C, Section 8.4. According to these specifications, sample analysis will take place in two phases, as described below.

2.2.1 Phase I

The 12 samples from the six locations (locations 2, 3, 20, 21, 27, and 28 on Figure 2-1) where the RI/FS data indicated lead concentrations above the FRL will be analyzed for total lead and arsenic by the GFAA or ICP method, and also will undergo the TCLP analysis for lead at an off-site laboratory. All other 0"-6" samples will be analyzed by the GFAA or ICP method, only, and the remaining portion will be archived for possible Phase II TCLP lead analysis. All samples not analyzed during Phase I will also be archived for possible Phase II analysis. Appendix B identifies the samples analyzed, and how they are analyzed, during Phase I, including duplicate samples.

2.2.2 Phase II

All samples analyzed for total lead and arsenic (but not TCLP lead) during Phase I of this investigation that reveal lead concentrations above the FRL of 400 mg/kg will be analyzed in Phase II by TCLP analysis for lead in anticipation of excavation. Also, at locations where the 0"-6" sample analyzed in Phase I revealed a lead concentration greater than the FRL, the 6"-12" samples will be analyzed by total lead and arsenic to determine the vertical extent of contamination, and also by TCLP for lead.

Sampling and analytical requirements for Phase I and Phase II analysis, including SCQ Analytical Support Levels (ASL), are listed in Table 2-2.

TABLE 2-2
SAMPLING AND ANALYTICAL REQUIREMENTS

ANALYTE	METHOD	SAMPLE MATRIX	LAB[a]	ASL	PRESERVE	HOLDING TIME	CONTAINER
Total Lead	GFAA/ICP	Solid	On-site	B	Cool to 4°C	6 months	500 ml Glass or Plastic
Total Lead	"	"	Off/on-site	D	"	"	"
Arsenic	"	"	On-site	B	"	"	"
Arsenic	"	"	Off/on-site	D	"	"	"
TCLP Lead	TCLP	"	Off-site	D	"	"	"

[a] A minimum 10% of samples will be analyzed off-site at ASL D.

2.3 Sample Identification

Each sample will be assigned a unique sample identification number as follows:

A1P2TRAP-Sample Location-Depth ID-Suite-QC

Where:

A1P2TRAP = sample collected for the A1PII Trap Range investigation
Sample Location = location number (see Figure 2-1)
Depth ID = Sample depth identification (see Table 2-1), where the 0"-6" interval = "1", the 6"-12" interval = "2".
Suite = Analytical Suite. "M" = metals.
QC = Quality control sample. A "D" indicates a duplicate sample, where applicable. "X" will be used to indicate a Rinsate sample, as assigned by EM personnel.

Therefore, the 0"-6" duplicate sample from location 21 will be identified as A1P2TRAP-21-1-M-D, and the 6"-12" normal sample from location 21 will be identified as A1P2TRAP-21-2-M.

3.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

3.1 QUALITY CONTROL SAMPLES

A minimum of 1 per 10 samples must be analyzed off-site, per requirements of the SEP and DQO SL-036, Rev. 2. Therefore, samples designated for off-site analysis will be split, with the split portion serving as the duplicate sample analyzed on-site. Rinsates will be collected at a minimum of 1 per 20 samples analyzed at ASL D. Field blanks will not be collected unless conditions are conducive to cross contamination, at the discretion of the Project Manager. If the Geoprobe® is used, a container blank will be collected to serve as the Geoprobe® liner container blank for A1PII. No trip blanks will be collected since volatile organics are not a target analyte.

3.2 PROJECT REQUIREMENTS FOR SURVEILLANCES

Independent assessment will be performed by the Fernald Environmental Management Project (FEMP) QA organization by conducting surveillances. At a minimum, one surveillance will be conducted, consisting of monitoring/observing on-going project activity and work areas to verify conformance to specified requirements. Surveillances will be planned and documented in accordance with Section 12.3 of the SCQ.

3.3 CHANGES TO THE PROJECT SPECIFIC PLAN

Prior to the implementation of changes, SCEP team members who sign this PSP must sign the Variance/Field Change Notice (V/FCN). A variance can be obtained verbally or via electronic mail in the interim, until a written variance is approved with signatures. This SCQ requirement will ensure consistency in managing changes to a PSP. Once these signatures have been obtained from those team members, the changes may be implemented. Changes to the PSP will be noted in the applicable project field logbook, and the V/FCN will be generated by the individual initiating the change. QA must receive the completed V/FCN, which includes the signatures of the Area 1, Phase II Manager, the Field Sampling Lead, and the QA representative within seven days of granting approval for the change.

4.0 EQUIPMENT DECONTAMINATION

Field sampling personnel shall ensure that the sampling equipment is clean prior to transport to the field site and decontaminated again after all sampling is completed. Decontamination serves to protect worker health and safety and also prevents the introduction of contaminants from sampling equipment to subsequent soil samples. Equipment that comes into contact with the sample will be decontaminated at Level II (Section K.11, SCQ) in the field. Clean disposable wipes may be used to replace air drying of the equipment.

5.0 HEALTH AND SAFETY

Project personnel will conform to project permits approved by the Utility Engineering, Industrial Hygiene, and Radiological Control. Each team member operating in the field will read and sign applicable safety permits prior to initiating assigned project duties. The Field Lead will ensure that each team member performing field activities under the scope of this project has read the applicable survey/permits that protect worker safety and health. Personnel who do not read, concur, and sign these documents will not participate in the execution of field activities related to the assigned project responsibilities. A copy of applicable safety permits/surveys issued for worker safety and health will be posted at each field location. At the completion of the project, the completed forms will be submitted for incorporation into the project record files.

6.0 DISPOSITION OF WASTES

During completion of sampling activities, EM personnel may generate small amounts of soil, water, and contact waste. Management of these waste streams will be coordinated with SCEP Waste Disposition Support Services (WDSS) through the Project Waste Identification Document (PWID) process. Soils will be spread at the point of origin, i.e., sampling locations. Generation of decontamination waters will be minimized in the field, and whenever possible, equipment will be decontaminated at a facility that discharges to the Advanced Wastewater Treatment facility (AWWT), either directly or indirectly through the stormwater collection system. Contact waste generation will be minimized by limiting contact with sample media, and by only using disposable materials which are necessary. This waste stream will be evaluated against dumpster criteria during the PWID process. If it does not meed these criteria, an alternative disposition will be identified.

7.0 DATA MANAGEMENT

A data management process will be implemented so information collected during the investigation will be properly managed to satisfy data end use requirements after completion of the field activities. As specified in Section 5.1 of the SCQ, sampling teams will describe daily activities on the Field Activity Log (FAL) which should be sufficient for accurate reconstruction of the events at a later date without reliance on memory. Sample Collection Logs and Borehole Abandonment Records will be completed according to protocol specified in Appendix B of the SCQ and in applicable procedures. These forms will be maintained in loose-leaf form and uniquely numbered following the field sampling event.

Field documentation, such as the Field Activity Log, Sample Collection Log, and Borehole Abandonment Record will undergo an internal QA/QC review by the EM Sample Technicians. A second QA/QC review of the records will be performed by FEMP QA personnel. Copies of the records will then be generated and delivered to data entry personnel for input into the Oracle System. All of the analytical data will be validated to ASL D by the FEMP validation team, per requirements of the SEP and DQO SL-036, Rev. 2.

Analytical data will be entered into the FEMP SED by Analytical Data Management personnel. Manual, double keyed, data entry will be performed and data entered will be compared to the original data sheets. Corrections will be made then initialed and dated as necessary. Hard-copy data reports and documents are kept in permanent storage in the Project files. The electronic database is permanently archived in a neutral ASCII file format.

APPENDIX A

DATA QUALITY OBJECTIVES SL-036, Rev. 2

Control Number _____

Fernald Environmental Management Project

Data Quality Objectives

Title: Delineating the Extent of Soil Constituents of Concern

Number: SL-036

Revision: 2

Final Draft: August , 1997

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Steve Garland
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Rev. #	0	1	2				
Effective Date:	05/05/97	07/29/97					

DATA QUALITY OBJECTIVES
Delineating the Extent of Soil Constituents of Concern

Members of Data Quality Objectives (DQO) Scoping Team

The members of the DQO team include a project lead, a project engineer, a field lead, a statistician, a lead chemist, a sampling supervisor, and a data management lead.

Conceptual Model of the Site

Soil is considered contaminated if the concentration of a constituent of concern (COC) exceeds the final remediation levels (FRLs). The extent of soil contamination was estimated and published in the Operable Unit 5 Feasibility Study (FS). These estimates were based on kriging analysis of available uranium data for soil collected during the Remedial Investigation (RI) effort and other FEMP environmental characterization studies. Maps outlining contaminated soil boundaries were generated for the Operable Unit 5 FS by overlaying the results of the kriging analysis of uranium data with isoconcentration maps of the other constituents of concern (COCs), as presented in the Operable Unit 5 RI report, and further modified by spatial analysis of maps reflecting the most current soil characterization data. A sequential remediation plan has been presented that subdivides the FEMP into seven construction areas. During the course of remediation, areas of soil may require additional characterization so soil remediation can be carried out as thoroughly and efficiently as possible. As a result, additional sampling may be necessary to accurately delineate a volume of soil as exceeding a target level, such as the FRL or WAC.

1.0 Statement of Problem

If the extent (depth and/or area) of soil COC contamination is unknown, then it must be defined with respect to the appropriate target level (FRL, WAC, or other specified soil concentration).

2.0 Identify the Decision

Delineate the horizontal and/or vertical extent of soil COC contamination in an area with respect to the appropriate target level.

3.0 Inputs That Affect the Decision

Informational Inputs - Historical data, process history knowledge, the modeled extent of COC contamination, and the origins of contamination will be required to establish a sampling plan to delineate the extent of COC contamination. The desired precision of the delineation must be weighed against the cost of collecting and analyzing additional samples in order to determine the optimal sampling density. The confidence limits for delineation boundaries will be specified in pre-design planning documents.

Action Levels - COCs must be delineated with respect to a specific action level, such as soil FRLs and OSDF WAC concentrations. Soil FRLs are established in the OU2 and OU5 RODs, and the WAC concentrations are published in the OU5 ROD. Soil COCs may also require delineation with respect to other action levels that act as remediation drivers, such as BTVs and ALARA levels.

4.0 The Boundaries of the Situation

Temporal Boundaries - Sampling must be completed within a time frame sufficient to meet the soil remediation schedule. Time frames must allow for the scheduling of sampling and analytical activities, the collection of samples, analysis of samples and the processing of analytical data when received.

Scale of Decision Making - The decision made based upon the data collected in this investigation will be the extent of soil COC contamination at or above the appropriate action level. This delineation will result in soil contaminant concentration information being incorporated into engineering design, and the attainment of established remediation goals.

Parameters of Interest - The parameters of interest are the desired action levels of soil COCs that have been determined to require additional delineation before soil remediation design can be finalized with the optimal degree of accuracy.

5.0 Decision Rule

If existing data provide an unacceptable level of uncertainty in the COC delineation model, then additional sampling will take place to decrease the model uncertainty. When deciding in additional soil concentration data is needed, the costs of additional sampling and analysis must be weighed against the benefit of reduced uncertainty in the delineation model, which will eventually be used for assigning excavation, or for other purposes.

6.0 Limits on Decision Errors

In order to be useful, data must be collected with sufficient areal and depth coverage, and at sufficient density to ensure an accurate delineation of soil COC concentrations. Analytical sensitivity and reproducibility must be sufficient to differentiate the COC concentrations below their respective target levels.

Types of Decision Errors and Consequences

Decision Error 1 - This decision error occurs when the decision maker determines that the extent of soil contaminated with COCs above action levels is not as extensive as it actually is. This error can result in a remediation design that fails to incorporate soil contaminated with COC(s) above the action level(s). This could result in the re-mobilization of excavation equipment and delays in the soil

remediation schedule. Also, this could result in soil contaminated above action levels remaining after remediation is considered complete, posing a potential threat to human health and the environment.

Decision Error 2 - This decision error occurs when the decision maker determines that the extent of soil contaminated above COC action levels is more extensive than it actually is. This error could result in more excavation than necessary, and this excess volume of soil being transferred to the OSDF, or an off-site disposal facility if contamination levels exceed the OSDF WAC.

True State of Nature for the Decision Errors - The true state of nature for Decision Error 1 is that the maximum extent of contamination above the soil FRL is more extensive than was determined. The true state of nature for Decision Error 2 is that the maximum extent of contamination above the soil FRL is not as extensive as was determined. Decision Error 1 is the more severe error.

7.0 Optimizing Design for Useable Data

7.1 Sample Collection

A sampling and analytical testing program will be carried out for the purpose of delineating the extent of COC contamination in a given area with respect to the action level of interest. Existing data, process knowledge, modeled concentration data, and the origins of contamination will be considered when determining the lateral and vertical extent of sample collection. The cost of collecting and analyzing additional samples, when weighed against the reduced uncertainty in the delineation model, will determine the sampling density. Individual PSPs will identify the locations and depths to be sampled, along with the sampling density necessary to obtain the desired accuracy of the delineation. The Geoprobe® technique or an alternate method identified in SMPL-01, *Solids Sampling,* will be used to obtain soil samples at required depth. The PSP will identify the sampling increments to be selectively analyzed for concentrations of the COC(s) of interest, along with field work requirements. As a QC measure, one in ten (10%) of the soil samples collected will be split and submitted to both the on-site and approved off-site laboratories. The split portions analyzed on-site will serve as laboratory duplicate samples for QC purposes. Results obtained from these analyses will also be used as delineation data. Analytical requirements will be listed in the PSP. The chosen analytical methodologies are able to achieve a detection limit capable of resolving the FRL(s).

7.2 COC Delineation

The soil COC delineation will utilize all data collected under the PSP, and if deemed appropriate by the Project Lead, may also include existing soil concentration data obtained from physical samples, and if applicable, information obtained through real-time screening. The delineation may be accomplished through modeling (e.g. kriging)

of the COC concentration data with a confidence limit specific to project needs that will reduce the potential for decision error 1. A very conservative approach to delineation may be utilized, where the boundaries of the contaminated soil are extended to the first known vertical and horizontal sample locations that reveal concentrations below the desired action level.

7.3 QC Considerations

Ninety percent (90%) of the samples collected will be submitted to the on-site laboratory and analyzed for the indicated contaminants at ASL B. Laboratory work will follow the requirements specified in the SCQ. The remaining ten percent (10%) of the samples collected will be split (as a QC duplicate) and analyzed both on-site and sent to an off-site qualified full service laboratory. The ten percent of the samples that are split will be analyzed both on-site and off-site at ASL D. Laboratory quality control measures include a soil prep blank, a laboratory control sample (LCS), matrix duplicates and matrix spike. Field quality control measures for ASL D samples include duplicate samples, equipment rinsates, field blanks, trip blanks, and container blanks. All field QC samples will be analyzed at ASL D. The frequency of field QC sampling is as follows: Duplicate samples will be taken at a minimum of one per 10 samples. Rinsates will be performed at a minimum of one per 20 on all field equipment that is re-used. Trip blanks will be taken at a minimum of one per shipping container when analyzing for volatile organic compounds (VOC's). Container blanks will be taken at a minimum of one per Area and Phase per container type (i.e. stainless steel core liner/ plastic core liner/ Geoprobe tube). Field blanks are not necessary for metals TAL analysis as it is unlikely in ambient field conditions to have metals cross contamination, however, the probability of cross contamination with semi-volatile organic compounds is much higher therefore for samples that will be analyzed for semi-volatile organic compounds (SVOC's) field blanks will be taken at a minimum of one per 20 samples. All data will undergo an evaluation by the Project Team, including a comparison for consistency with historical data.

7.4 Independent Assessment

Independent assessment shall be performed by the FEMP QA organization by conducting surveillances. Surveillances will be planned and documented in accordance with Section 12.3 of the SCQ.

7.5 Data Management

Upon receipt from the laboratory, all results will be entered into the SED as qualified data using standard data entry protocol. All of the ASL D data will undergo analytical validation by the FEMP validation team. A minimum of ten percent (10%) of field data will be validated by the FEMP QA validation team. The Project Manager will be responsible to determine data usability as it pertains to support the DQO decision of determining delineation of soil COC's.

7.6 Applicable Plans/Procedures

Sample collection under the PSP shall follow the requirements outlined within these existing site plans/procedures:

- Sitewide Excavation Plan (SEP)
- Sitewide CERCLA Quality Assurance Project Plan (SCQ).
- SMPL-01, *Solids Sampling*
- SMPL-21, *Collection of Field Quality Control Samples*
- EQT-06, *Geoprobe® Model 5400 Operation and Maintenance*
- EQT-23, *Operation of ADCAM Series Analyzers with Gamma Sensitive Detectors*
- EQT -30, *Operation of Radiation Tracking Vehicle Sodium Iodide Detection System*
- EQT-09, *Spectrace 9000 Field Portable X-Ray Fluorescence Spectrometer - Calibration, Operation, and Maintenance*

Data Quality Objectives
Delineating the Extent of Soil Constituents of Concern

1A. Task/Description: Delineating the extent of contamination above the FRLs

1.B. Project Phase: (Put an X in the appropriate selection.)

RI ☐ FS ☐ RD ☒ RA ☐ R,A ☐ OTHER ☐

1.C. DQO No.: SL-036, Rev. 2 DQO Reference No.: SL-043

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2. Media Characterization: (Put an X in the appropriate selection.)

Air ☐ Biological ☐ Groundwater ☐ Sediment ☐ Soil ☒

Waste ☐ Wastewater ☐ Surface water ☐ Other (specify) ____

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3. Data Use with Analytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization A ☒ B ☒ C ☐ D ☒ E ☐	Risk Assessment A ☐ B ☐ C ☐ D ☐ E ☐
Evaluation of Alternatives A ☐ B ☐ C ☐ D ☐ E ☐	Engineering Design A ☐ B ☐ C ☐ D ☐ E ☐
Monitoring during remediation A ☐ B ☐ C ☐ D ☐ E ☐	Other A ☐ B ☐ C ☐ D ☐ E ☐

4.A. Drivers: Remedial Action Work Plans, Applicable or Relevant and Appropriate Requirements (ARARs) and the OU2 and/or OU5 Record of Decision (ROD).

4.B. Objective: Delineate the extent of soil contaminated with a COC (or COCs) with respect to the action level(s) of interest.

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5. Site Information (Description):

6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

1.	pH	☐	2.	Uranium	☒ *	3.	BTX ☐
	Temperature	☐		Full Radiological	☒ *		TPH ☐
	Specific Conductance	☐		Metals	☒ *		Oil/Grease ☐
	Dissolved Oxygen	☐		Cyanide	☐		
	Technetium-99	☒ *		Silica	☐		

4.	Cations	☐	5.	VOA	☒ *	6. Other (specify)
	Anions	☐		BNA	☒ *	
	TOC	☐		Pesticides	☒ *	
	TCLP	☒ *		PCB	☒ *	
	CEC	☐		COD	☐	

*If constituent is identified for delineation in the individual PSP.

6.B. Equipment Selection and SCQ Reference:

Equipment Selection	Refer to SCQ Section
ASL A X, RTRAK / HPGe / XRF	SCQ Section: App. B Table 1
ASL B X	SCQ Section: App. G Tables G-1&G-3
ASL C	SCQ Section:
ASL D X	SCQ Section: App. G Tables G-1&G-3
ASL E	SCQ Section:

7.A. Sampling Methods: (Put an X in the appropriate selection.)

Biased	☒	Composite	☐	Environmental	☒	Grab	☒	Grid	☒
Intrusive	☒	Non-Intrusive	☐	Phased	☐	Source	☐		

DQO Number: SL-036, Rev. 2

7.B. Sample Work Plan Reference: This DQO is being written prior to the PSPs.

Background samples: OU5 RI

7.C. Sample Collection Reference:

Sample Collection Reference: SMPL-01, EQT-06

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8. Quality Control Samples: (Place an "X" in the appropriate selection box.)

8.A. Field Quality Control Samples:

Trip Blanks	[X] *	Container Blanks	[X] ++
Field Blanks	[X] +	Duplicate Samples	[X]
Equipment Rinsate Samples	[X]	Split Samples	[X] **
Preservative Blanks	[ ]	Performance Evaluation Samples	[ ]
Other (specify)			

*For volatile organics only
** Split samples will be collected where required by EPA or OEPA.
+ Taken at the discretion of the Project Manager (if warranted by field conditions)
++ One per Area and Phase per container type (i.e. stainless steel core liner/ plastic core liner/Geoprobe tube).

8.B. Laboratory Quality Control Samples:

Method Blank	[X]	Matrix Duplicate/Replicate	[X]
Matrix Spike	[X]	Surrogate Spikes	[ ]
Tracer Spike	[ ]		

Other (specify) Per SCQ

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.

APPENDIX B

Sample Identification for the Trap Range Lead Delineation

TABLE B.1
SAMPLE IDENTIFICATION FOR THE TRAP RANGE LEAD DELINEATION

Sample Location	Sample Depth	Sample Identification Number	Easting Coordinate ('83)	Northing Coordinate ('83)	Analyze During Phase I?	How Analyzed During Phase I? [a]
1	0"-6"	A1P2TRAP-1-1-M	1350950	479100	Yes	1
1	6"-12"	A1P2TRAP-1-2-M	1350950	479100	No	-
2	0"-6"	A1P2TRAP-2-1-M	1350938	479056	Yes	2
2	6"-12"	A1P2TRAP-2-2-M	1350938	479056	Yes	2
3	0"-6"	A1P2TRAP-3-1-M	1350944	479044	Yes	3
3	0"-6"	A1P2TRAP-3-1-M-D	1350944	479044	Yes	3*
3	6"-12"	A1P2TRAP-3-2-M	1350944	479044	Yes	3
3	6"-12"	A1P2TRAP-3-2-M-D	1350944	479044	Yes	3*
4	0"-6"	A1P2TRAP-4-1-M	1351400	479050	Yes	1
4	6"-12"	A1P2TRAP-4-2-M	1351400	479050	No	-
5	0"-6"	A1P2TRAP-5-1-M	1350850	479000	Yes	1
5	6"-12"	A1P2TRAP-5-2-M	1350850	479000	No	-
6	0"-6"	A1P2TRAP-6-1-M	1350950	479000	Yes	1
6	6"-12"	A1P2TRAP-6-2-M	1350950	479000	No	-
7	0"-6"	A1P2TRAP-7-1-M	1351650	479000	Yes	1
7	6"-12"	A1P2TRAP-7-2-M	1351650	479000	No	-
8	0"-6"	A1P2TRAP-8-1-M	1350650	478950	Yes	1
8	6"-12"	A1P2TRAP-8-2-M	1350650	478950	No	-
9	0"-6"	A1P2TRAP-9-1-M	1351250	478950	Yes	1
9	6"-12"	A1P2TRAP-9-2-M	1351250	478950	No	-
10	0"-6"	A1P2TRAP-10-1-M	1350950	478900	Yes	1
10	6"-12"	A1P2TRAP-10-2-M	1350950	478900	No	-
11	0"-6"	A1P2TRAP-11-1-M	1351450	478900	Yes	1
11	6"-12"	A1P2TRAP-11-2-M	1351450	478900	No	-
12	0"-6"	A1P2TRAP-12-1-M	1351550	478900	Yes	1
12	6"-12"	A1P2TRAP-12-2-M	1351550	478900	No	-
13	0"-6"	A1P2TRAP-13-1-M	1350850	478850	Yes	1
13	6"-12"	A1P2TRAP-13-2-M	1350850	478850	No	-
14	0"-6"	A1P2TRAP-14-1-M	1351750	478850	Yes	1
14	6"-12"	A1P2TRAP-14-2-M	1351750	478850	No	-
15	0"-6"	A1P2TRAP-15-1-M	1351350	478350	Yes	1
15	6"-12"	A1P2TRAP-15-2-M	1351350	478350	No	-
16	0"-6"	A1P2TRAP-16-1-M	1351300	478800	Yes	1
16	6"-12"	A1P2TRAP-16-2-M	1351300	478800	No	-
17	6"-12"	A1P2TRAP-17-2-M	1351800	478800	No	-
17	0"-6"	A1P2TRAP-17-1-M	1351800	478800	Yes	1
18	0"-6"	A1P2TRAP-18-1-M	1351700	478750	Yes	1

[a] The number in this column indicates how the sample will be analyzed in Phase I, as follows:

1 = On-site analysis of total lead and arsenic by GFAA or ICP at ASL B

2 = On-site analysis of total lead and arsenic by GFAA or ICP at ASL B; off-site TCLP lead analysis at ASL D

3 = Off-site analysis of total lead and arsenic by GFAA or ICP at ASL D; off-site TCLP lead analysis at ASL D

3* = QC on-site analysis of total lead and arsenic by GFAA or ICP at ASL D; off-site TCLP lead analysis at ASL D

4 = Off-site analysis of total lead and arsenic by GFAA or ICP at ASL D.

4* = QC on-site analysis of total lead and arsenic by GFAA or ICP at ASL D

- = Not analyzed during Phase 1.

TABLE B.1, continued

Sample Location	Sample Depth	Sample Identification Number	Easting Coordinate ('83)	Northing Coordinate ('83)	Analyze During Phase I?	How Analyzed During Phase I? [a]
18	6"-12"	A1P2TRAP-18-2-M	1351700	478750	No	-
19	0"-6"	A1P2TRAP-19-1-M	1350800	478700	Yes	1
19	6"-12"	A1P2TRAP-19-2-M	1350800	478700	No	-
20	0"-6"	A1P2TRAP-20-1-M	1351007	478692	Yes	2
20	6"-12"	A1P2TRAP-20-2-M	1351007	478692	Yes	2
21	0"-6"	A1P2TRAP-21-1-M	1351054	478713	Yes	3
21	0"-6"	A1P2TRAP-21-1-M-D	1351054	478713	Yes	3*
21	6"-12"	A1P2TRAP-21-2-M	1351054	478713	Yes	3
21	6"-12"	A1P2TRAP-21-2-M-D	1351054	478713	Yes	3*
22	0"-6"	A1P2TRAP-22-1-M	1351500	478300	Yes	1
22	6"-12"	A1P2TRAP-22-2-M	1351500	478300	No	-
23	0"-6"	A1P2TRAP-23-1-M	1351800	478700	Yes	1
23	6"-12"	A1P2TRAP-23-2-M	1351800	478700	No	-
24	0"-6"	A1P2TRAP-24-1-M	1350550	478650	Yes	1
24	6"-12"	A1P2TRAP-24-2-M	1350550	478650	No	-
25	0"-6"	A1P2TRAP-25-1-M	1351650	478650	Yes	1
25	6"-12"	A1P2TRAP-25-2-M	1351650	478650	No	-
26	0"-6"	A1P2TRAP-26-1-M	1350700	478600	Yes	1
26	6"-12"	A1P2TRAP-26-2-M	1350700	478600	No	-
27	0"-6"	A1P2TRAP-27-1-M	1350855	478595	Yes	3
27	0"-6"	A1P2TRAP-27-1-M-D	1350855	478595	Yes	3*
27	6"-12"	A1P2TRAP-27-2-M	1350855	478595	Yes	3
27	6"-12"	A1P2TRAP-27-2-M-D	1350855	478595	Yes	3*
28	0"-6"	A1P2TRAP-28-1-M	1351060	478555	Yes	3
28	0"-6"	A1P2TRAP-28-1-M-D	1351060	478555	Yes	3*
28	6"-12"	A1P2TRAP-28-2-M	1351060	478555	Yes	3
28	6"-12"	A1P2TRAP-28-2-M-D	1351060	478555	Yes	3*
29	0"-6"	A1P2TRAP-29-1-M	1351800	478600	Yes	1
29	6"-12"	A1P2TRAP-29-2-M	1351800	478600	No	-
30	0"-6"	A1P2TRAP-30-1-M	1350800	478550	Yes	1
30	6"-12"	A1P2TRAP-30-2-M	1350800	478550	No	-
31	0"-6"	A1P2TRAP-31-1-M	1351700	478550	Yes	1
31	6"-12"	A1P2TRAP-31-2-M	1351700	478550	No	-
32	0"-6"	A1P2TRAP-32-10-M	1350600	478500	Yes	1
32	6"-12"	A1P2TRAP-32-2-M	1350600	478500	No	-
33	0"-6"	A1P2TRAP-33-1-M	1350950	478500	Yes	1
33	6"-12"	A1P2TRAP-33-2-M	1350950	478500	No	-
34	0"-6"	A1P2TRAP-34-1-M	1351600	478500	Yes	1

[a] The number in this column indicates how the sample will be analyzed in Phase I, as follows:

1 = On-site analysis of total lead and arsenic by GFAA or ICP at ASL B

2 = On-site analysis of total lead and arsenic by GFAA or ICP at ASL B; off-site TCLP lead analysis at ASL D

3 = Off-site analysis of total lead and arsenic by GFAA or ICP at ASL D; off-site TCLP lead analysis at ASL D

3* = QC on-site analysis of total lead and arsenic by GFAA or ICP at ASL D; off-site TCLP lead analysis at ASL D

4 = Off-site analysis of total lead and arsenic by GFAA or ICP at ASL D.

4* = QC on-site analysis of total lead and arsenic by GFAA or ICP at ASL D

- = Not analyzed during Phase 1.

TABLE B.1, continued

Sample Location	Sample Depth	Sample Identification Number	Easting Coordinate ('83)	Northing Coordinate ('83)	Analyze During Phase I?	How Analyzed During Phase I? [a]
34	6"-12"	A1P2TRAP-34-2-M	1351600	478500	No	-
35	0"-6"	A1P2TRAP-35-1-M	1350750	478450	Yes	1
35	6"-12"	A1P2TRAP-35-2-M	1350750	478450	No	-
36	0"-6"	A1P2TRAP-36-1-M	1351250	478450	Yes	1
36	6"-12"	A1P2TRAP-36-2-M	1351250	478450	No	-
37	0"-6"	A1P2TRAP-37-1-M	1351350	478450	Yes	1
37	6"-12"	A1P2TRAP-37-2-M	1351350	478450	No	-
38	0"-6"	A1P2TRAP-38-1-M	1351750	478450	Yes	1
38	6"-12"	A1P2TRAP-38-2-M	1351750	478450	No	-
39	0"-6"	A1P2TRAP-39-1-M	1350900	478400	Yes	1
39	6"-12"	A1P2TRAP-39-2-M	1350900	478400	No	-
40	0"-6"	A1P2TRAP-40-1-M	1351100	478400	Yes	1
40	6"-12"	A1P2TRAP-40-2-M	1351100	478400	No	-
41	0"-6"	A1P2TRAP-41-1-M	1351500	478400	Yes	1
41	6"-12"	A1P2TRAP-41-2-M	1351500	478400	No	-
42	0"-6"	A1P2TRAP-42-1-M	1350750	478350	Yes	1
42	6"-12"	A1P2TRAP-42-2-M	1350750	478350	No	-
43	0"-6"	A1P2TRAP-43-1-M	1351000	478350	Yes	1
43	6"-12"	A1P2TRAP-43-2-M	1351000	478350	No	-
44	0"-6"	A1P2TRAP-44-1-M	1351700	478350	Yes	1
44	6"-12"	A1P2TRAP-44-2-M	1351700	478350	No	-
45	0"-6"	A1P2TRAP-45-1-M	1350900	478300	Yes	4
45	0"-6"	A1P2TRAP-45-1-M-D	1350900	478300	Yes	4*
45	6"-12"	A1P2TRAP-45-2-M	1350900	478300	No	-
45	6"-12"	A1P2TRAP-45-2-M-D	1350900	478300	No	-
46	0"-6"	A1P2TRAP-46-1-M	1351150	478350	Yes	1
46	6"-12"	A1P2TRAP-46-2-M	1351150	478350	No	-
47	0"-6"	A1P2TRAP-47-1-M	1351600	478250	Yes	1
47	6"-12"	A1P2TRAP-47-2-M	1351600	478250	No	-
48	0"-6"	A1P2TRAP-48-1-M	1350600	478200	Yes	1
48	6"-12"	A1P2TRAP-48-2-M	1350600	478200	No	-
49	0"-6"	A1P2TRAP-49-1-M	1351200	478200	Yes	1
49	6"-12"	A1P2TRAP-49-2-M	1351200	478200	No	-
50	0"-6"	A1P2TRAP-50-1-M	1351700	478200	Yes	1
50	6"-12"	A1P2TRAP-50-2-M	1351700	478200	No	-

[a] The number in this column indicates how the sample will be analyzed in Phase I, as follows:
1 = On-site analysis of total lead and arsenic by GFAA or ICP at ASL B
2 = On-site analysis of total lead and arsenic by GFAA or ICP at ASL B; off-site TCLP lead analysis at ASL D
3 = Off-site analysis of total lead and arsenic by GFAA or ICP at ASL D; off-site TCLP lead analysis at ASL D
3* = QC on-site analysis of total lead and arsenic by GFAA or ICP at ASL D; off-site TCLP lead analysis at ASL D
4 = Off-site analysis of total lead and arsenic by GFAA or ICP at ASL D.
4* = QC on-site analysis of total lead and arsenic by GFAA or ICP at ASL D
- = Not analyzed during Phase 1.

APPENDIX C

Target Analyte Lists (TAL)

TARGET ANALYTE LIST
AREA 1 PHASE II TRAP RANGE SAMPLING
Project Number 50.03.59.01

TAL 50.03.59.01-A

GFAA or ICP Method		
1	ASL B	Lead
2	ASL B	Arsenic

Pre-Design Investigation Sampling

TARGET ANALYTE LIST
AREA 1 PHASE II TRAP RANGE SAMPLING
Project Number 50.03.59.01

TAL 50.03.59.01-B

Toxicity Characteristic Leachate Procedure		
1	ASL D	Lead

Pre-Design Investigation Sampling

TARGET ANALYTE LIST
AREA 1 PHASE II TRAP RANGE SAMPLING
Project Number 50.03.59.01

TAL 50.03.59.01-C

GFAA or ICP Method		
1	ASL D	Lead
2	ASL D	Arsenic

Pre-Design Investigation Sampling